Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Amendment of Parts 1, 21, 73, 74 and 101 of the Commission's Rules to Facilitate the Provision of Fixed and Mobile Broadband Access, Educational and Other Advanced Services in the 2150-2162 and 2500-2690 MHz Bands	)	WT Docket No. 03-66 RM-10586
	)	WT Docket No. 03-67
Part 1 of the Commission's Rules - Further Competitive Bidding Procedures	)	
	)	MM Docket No. 97-217
Amendment of Parts 21 and 74 to Enable Multipoint Distribution Service and the Instructional Television Fixed Service Amendment of Parts 21 and 74 to Engage in Fixed Two-Way Transmissions	)	
	)	WT Docket No. 02-68
Amendment of Parts 21 and 74 of the Commission's Rules With Regard to Licensing in the Multipoint Distribution Service and in the Instructional Television Fixed Service for the Gulf of Mexico	)	RM-9718
	)	WT Docket No. 00-230
Promoting Efficient Use of Spectrum Through Elimination of Barriers to the Development of Secondary Markets	)	

Comments of Red New York E Partnership

Red New York E Partnership ("Red New York E") files herewith, by its attorneys, its Comments in response to the *Further Notice of Proposed Rulemaking* in the instant proceeding (hereafter *"Further Notice"*).[1]

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[1] *See In the Matter of Amendment of Parts 1, 21, 73, 74 and 101 of the Commission's Rules to Facilitate the Provision of Fixed and Mobile Broadband Access, Educational and Other Advanced Services in the 2150-2162 and 2500-2690 MHz Bands*, Report and Order and Further Notice of Proposed Rulemaking, 19 FCC Rcd 14165 (2004) (*"R&O and FNPRM"*).

These Comments address the issue raised in the *Further Notice* concerning the status to be accorded MDS stations assigned to the E and F channels and nearby grandfathered E and F Channel ITFS stations.[2] Red New York E, the licensee of MMDS Station WLR500, is licensed on the E channels in New York City, nearby to several grandfathered ITFS stations on the E and F channels, and is therefore directly affected by this issue.

In the *R&O and FNPRM*, the Commission adopted Geographic Service Areas ("GSAs") for ITFS and MDS stations.[3] GSAs are created by splitting the football-shaped areas of any overlapping Protected Service Areas ("PSAs") of co-channel ITFS and MDS licenses.[4] The Station WLR500 PSA, which was established by the Commission's Rules that preceded the instant proceeding, is a 35-mile radius centered on the Empire State Building. Thus, unless different rules are adopted for stations such as Station WLR500, that station's GSA will be its PSA reduced by half of the overlap area with the PSAs of grandfathered ITFS E group stations.[5]

However, in the *Further Notice*, the Commission questioned whether it should apply the same rules regarding the adoption and creation of GSAs to grandfathered ITFS stations, and, if so, how such rules would affect the co-channel MDS stations. In the *Further Notice* the Commission noted that:

> "In 1983, the Commission redesignated the E and F Group ITFS channels from the ITFS service to MDS usage. The Commission took this action in an effort to spur the development of MDS to promote effective and intense utilization of the spectrum leading to its highest valued use. As part of its decision, the Commission grandfathered ITFS licensees operating on the E Group and F Group channels subject to the following limitations:
>
> > "Grandfathered ITFS stations operating on the E and F channels will only be protected to the extent of their service that is either in the operation or the application stage as of May 26, 1983. These licensees or applicants will not generally be permitted to change transmitter location or antenna

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[2] *See Further Notice* at ¶¶ 333-343.
[3] *R&O and FNPRM* at ¶54.
[4] *Id.* at ¶60.
[5] *See* 47 C.F.R. § 27.1206.

height, or to change transmission power. In addition, any new receive stations added after May 26, 1983 will not be protected against interference from MDS transmissions. In this fashion, all facets of grandfathered ITFS operations were frozen as of May 26, 1983.

". . .

"We seek comment on how to modify our rules concerning grandfathered E and F channel ITFS stations in order to equitably allow both MDS and ITFS stations to provide advanced broadband wireless services. We ask whether it makes sense to adopt different approaches to different scenarios, rather then a one size fits all approach.

"The first scenario that we envision is where the PSA of the grandfathered E and F Group ITFS licensee almost entirely overlaps the PSA of the co-channel MDS licensee. In this scenario, we seek comment on whether in keeping with the intent and spirit of the Commission's 1983 *E and F Group Reallocation Order* to free up spectrum for MDS,[6] we should require grandfathered E and F Group ITFS licensees to operate on a secondary non-interference basis to the co-channel MDS licensee. . .

"Alternatively, we seek comment on allowing grandfathered E and F Group ITFS licensees to modify their equipment and be given a GSA, while the co-channel MDS operators would have to operate on a secondary non-interference basis. . . .

"A third approach would be to rely on voluntary negotiations between the parties. The Commission stated in 1983 that '[it] expect[s] that the MDS permittees and the ITFS users of the reallocated channels will negotiate in good faith to mutually accommodate each others' communications requirements.' Given the lack of progress in some markets between co-channel MDS licensee and grandfathered E and F Group ITFS licensee, we question whether continued reliance on negotiations would be appropriate. Nevertheless, we seek comment on whether there are changes we could make to our rules that could make negotiations more effective."[7]

In the instant Comments, Red New York E demonstrates, it submits, that no change in the new rules is called for, and that the Commission can, in fact, rely on affected parties to cooperate at least to the extent necessary to minimize interference and optimize coverage near the borders of their GSAs.[8]

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[6] *See E and F Group Reallocation Order,* 94 FCC 2d at 1228-29 ¶¶ 61 - 63.

[7] *Further Notice* at ¶¶ 333-340 *(footnotes omitted).* Because the *Further Notice* refers to the stations that are the subject of its request for comments, and therefore of the instant Comments, as MDS and ITFS stations, we have used that terminology throughout the Comments to avoid confusion, even though under the new rules those stations will be BRS and EBS stations.

[8] On the basis of this conclusion, the other two issues raised by the Commission answer them-

Red New York E's Station WLR500 is located 12.4 miles from co-channel ITFS Station KRS82 in New York City, and 14.2 miles from co-channel ITFS Station KRS83 in Yonkers, New York. The next-closest co-channel stations are ITFS Stations KRS85 in Beacon, New York and KNZ65 in Uniondale, New York. The last-named station is licensed to the Diocese of Rockville Center; the others are licensed to the Archdiocese of New York. KRS85 is 51.8 miles and KRS65 is 70.1 miles from WLR500. The presence of these stations significantly constricts the GSA of Station WLR500, from a circle with a 35-mile radius to a long, relatively narrow area that is almost rectangular in shape.[9] Despite these constrictions, it would be entirely feasible, as shown by Attachment A hereto, the Design Study Report of C. J. Hall, to provide a mobile data/phone service in the GSA, even without cooperation from adjoining GSAs:

> "RF modeling shows this system can provide useful coverage to a majority of the population within the Geographic Service Area (GSA) of the licensee, while meeting the interference and technical requirements of the Rules."[10]
>
> "Given the coverage as shown in the example design, population service is as follows:
> Urban in building: 1,639,738 persons, 25.2% of the total within the GSA
> Suburban in vehicle or better: 4,089,844 persons, 62.9% of the total within the GSA
> Suburban open area or better: 5,217,999 persons, 80.2% of the total within the GSA
> (Total population within the GSA: 6,507,627)."[11]

Since service can be provided to this extent within the WLR500 GSA without the need for cooperation from adjoining licensees, and since the WLR500 GSA is constricted to an extreme degree, it is reasonable to conclude, we submit, that in general useful service can be pro-

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selves. First, if, as we advocate, no special rule is called for with regard to two stations whose areas largely overlap each other, *a fortiori* no rule is called for regarding stations which are farther apart. And, second, since the Commission has determined that in general ITFS receive sites outside the GSA are not entitled to protection, there is no reason they should be given protection solely because MDS licensed E and F channel stations are nearby to grandfathered ITFS E and F channel stations.

[9] *See* Attachment A hereto, the Design Study Report of C. J. Hall, President of Wireless Systems Engineering, Inc., at p. 8.
[10] *Id.* at p. 1.
[11] *Id.* at p. 7.

vided within the GSAs of grandfathered ITFS E and F stations and the MDS E and F stations located nearby.

There is certainly no justification for converting MDS E and F licensees into second-class status when those licensees have historically been entitled to dominant rather than subservient status.[12] The fact is that special rules are not necessary to permit the affected licensees of the GSAs in question to provide useful service. Moreover, the MDS-ITFS disputes that have from time to time presented themselves to the Commission are, we submit, unimportant as evidence of how the licensees will conduct themselves in the future. Those disputes have been over conflicting claims as to licensee rights and will be resolved by the close of the instant proceeding. Once the boundaries are clearly established by Commission rule, it will clearly be in the interests of all licensees to cooperate with adjacent and other nearby licensees to promote service optimization, just as licensees in other broadband services routinely cooperate to minimize interference and optimize service at the mutual boundaries of their service areas.

For the foregoing reasons, Red New York E strongly recommends to the Commission that it adopt no special technical, interference or service rules affecting grandfathered E and F-

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[12] *See In the Matter of Amendment of Parts 2, 21, 74, and 94 of the Commission's Rules and Regulations in Regard to Frequency Allocation to the Instructional Television Fixed Service, the Multipoint Distribution Service and the Private Operational Fixed Microwave Service*, Report and Order, 94 FCC 2d 1203 (1983), *aff'd on reconsideration*, Memorandum Opinion and Order on Reconsideration, 98 FCC 2d 129 (1983). *See also, In the Matter of Trans Video Communications, Inc.*, DA 03-2942, at ¶ 9 (September 25, 2003) ("[T]he Commission determined that it would be in the public interest to allow MDS operators to use [the E and F] channels, as opposed to allowing ITFS operators to modify or expand their systems.")

channel stations and nearby E and F-channel MDS stations, but rather apply the rules contained in the *R&O* and *FNPRM* to these stations.

Respectfully submitted,

Red New York E Partnership

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Attachment A

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Red New York E Partnership Design Study Report

January 9, 2005

Introduction

The Report is intended to accompany the Comments of Red New York E Partnership (RNYE), the licensee of Multipoint Distribution Service (MDS) E1-E4 channels, Call Sign WLR500 in New York City, in response to the *Further Notice of Proposed Rulemaking* in WT Docket No. 03-66. In the same docket, the FCC adopted a *Report and Order* that fundamentally restructures the MDS and Instructional Television Fixed Service (ITFS) bands, with additional flexibility to provide new and innovative services, especially mobile telephone and data services. After the restructuring, MDS becomes the Broadband Radio Service (BRS) and IFTS becomes the Educational Broadband Service (EBS). This report utilizes the pre-restructuring nomenclature throughout.

In the *Further Notice*, the issue is raised as to whether MDS E and F stations and nearby grandfathered ITFS E and F stations can feasibly operate under the new Rules, even in the absence of cooperation between the licensees.

This Report concludes, using RNYE's station as an example, that it is indeed feasible for commercial and grandfathered E and F channels to operate under the new Rules. This Report concentrates on the Lower Band Segment (LBS) and Upper Band Segment (UBS) conversion to a mobile data/phone service, and details a preliminary design for a system compliant with the Rules. RF modeling shows this system can provide useful coverage to a majority of the population within the Geographic Service Area (GSA) of the licensee, while meeting the interference and technical requirements of the Rules. This system has a cell count and cell spacing consistent with mature PCS systems in high population density areas, thus the deployment is shown to be feasible.

This Report has been prepared by C. J. Hall, P.E., President of Wireless Systems Engineering, Inc. (WSE). A statement of Mr. Hall's qualifications is attached to this Report as Appendix A.

1) The FCC Rebanding Plan

The Commission has reallocated the 2.5 GHz band into three major sections: The Lower Band Segment (LBS), Middle Band Segment (MBS) and Upper Band Segment (UBS). The MBS may be used for higher-power broadcast than the other segments, but the rules permit low power applications in the MBS as in the LBS and UBS. The LBS and UBS are allocated into a series of channels, 5.5 and 6 MHz wide.

Prior to transition, WLR500 uses MDS channels E1-E4:

E1 2596-2602 MHz,
E2 2608-2614 MHz,
E3 2620-2626 MHz,
E4 2632-2638 MHz

After transition, WLR500 will use BRS channels E1-E4:

E1 2624-2629.5 MHz,
E2 2629.5-2635 MHz,
E3 2635-2640.5 MHz,

and in the Middle Band Segment,

E4 2608-2614 MHz

Thus, channels E1-E3 will provide 16.5 MHz of contiguous bandwidth, which is suitable for voice and high speed data services. Channel E4 may be used for the same purpose, or for higher power broadcast. (The use of channel E4 for low-power cellular-type services is not addressed here for such use is affected by other MBS channels in the region, and whether those channels will deploy high or low power services, and in what configuration, under the new rules is currently unknown).

The Commission does not mandate the technology to be used on these channels, preferring to be technology neutral and allowing the licensee to choose the technology for its channels. The Rules do state that the channels can be further subdivided by the licensee, specify out of band emissions masks, and provide that digital modulations must be used.

2) <u>Examination of Technology - UMTS</u>

Although the Rules are technology neutral, there are several factors that will affect the licensee's choice of technology. The design herein uses UMTS technology. UMTS is a "3G" or third generation technology. It is being adopted internationally for the 2.5 GHz band per ITU recommendations, and is being deployed by major Cellular and PCS carriers in the United States. Base station equipment and subscribers units utilizing this technology in the 2.5 GHz band will be sold to numerous countries, so it should be readily available at competitive pricing. Further, using a technology supported internationally in this band could facilitate international roaming service, an attractive feature for a system operating in the New York City area as WLR500 does.

Subscriber data throughput of 384 kbps is not unreasonable to expect from a macrocell, and even higher rates are possible. As it is being deployed in Cellular and PCS bands in the United States, it is not unreasonable to expect that multimode phones supporting 2.5 GHz, and either or both 800MHz (Cellular) / 1900 MHz (PCS) frequencies will become readily available. If so, roaming with other U.S. carriers could greatly enhance the mobility of subscribers utilizing WLR500's service offering.

Two notable variants of UMTS are Frequency Division Duplexing (FDD) and Time Division Duplexing (TDD). FDD uses symmetrical forward and reverse paired frequency bands.
TDD technology, on the other hand, sends forward and reverse traffic over the same RF channel, so it needs no paired channel sets. It is possible to asymmetrically allocate forward and reverse data capacity using TDD. It can work within the 16.5 MHz contiguous bandwidth available to

WLR500, and, in fact, the FCC channelization fits it well. One should note that it can also be used in the MBS channel (E4), but the capacity and useful range will be affected by the usage, power, and transmitter locations of other licensees on adjacent MBS and UBS channels.

In choosing UMTS TDD for the design presented herein, it was not necessary to choose whether the system would be primarily voice or data. The logic of the choice applies either way. There are some differences in the voice vs. high rate data link budgets however, so once UMTS TDD was chosen, it became necessary to select one as the primary application, but the link budgets are similar. In fact, it's appropriate to note that though the link budget presented herein is for UMTS 144 kbps data throughput, but the power efficiency per bit is similar for all biphase and quadriphase shift keyed cellular/PCS systems.

In other words, UMTS is the most logical technology to use for the design herein in light of international deployment and equipment availability, but the resulting system is representative of other '3G' technologies. The overall system feasibility discussed herein doesn't rest on the specific choice of UMTS TDD. It simply provides a representative, logical, and viable technology example.

Before proceeding with a preliminary design in an RF coverage modeling tool, it's necessary to examine the constraints and link budget for the system. The Commission has specified that an RF level of 47 dBµV/m shall not be exceeded by a carrier at the boundary of the GSA. This constrains the design and placement of cell sites. The other major constraint is the link budget for UMTS TDD, including the building and vehicle penetration allowances to include.

A typical link budget for UMTS is presented below.

Reverse Link Budget

Cell Type		**Urban - in building**			**Suburban - in vehicle**			**Suburban - outdoor**		
Service		**voice**	**144 data**	**384 data**	**voice**	**144 data**	**384 data**	**voice**	**144 data**	**384 data**
MS TX power	dBm	21.00	25.00	28.00	21.00	25.00	28.00	21.00	25.00	28.00
MS antenna gain	dBd	-2.16	0.00	0.00	-2.16	0.00	0.00	-2.16	0.00	0.00
Body losses	dB	-3.00	-3.00	-3.00	-3.00	-3.00	-3.00	-3.00	-3.00	-3.00
Penetration losses	dB	-18.00	-18.00	-18.00	-8.00	-8.00	-8.00	-1.50	-1.50	-1.50
BS antenna gain (horizon)	dBd	14.10	14.10	14.10	14.10	14.10	14.10	14.10	14.10	14.10
BS cable loss	dB	-2.97	-2.97	-2.97	-3.45	-3.45	-3.45	-3.45	-3.45	-3.45
Lognormal Fade Margin	dB	-7.86	-7.86	-7.86	-6.20	-6.20	-6.20	-5.61	-5.61	-5.61
Power control headroom	dB	0.00	-3.00	-3.00	0.00	-3.00	-3.00	0.00	-3.00	-3.00
Interference margin	dB	-3.98	-3.98	-3.98	-3.01	-3.01	-3.01	-3.01	-3.01	-3.01
Soft handover gain	dB	3.00	0.00	0.00	3.00	0.00	0.00	3.00	0.00	0.00
BS RX sensitivity	dBm	-124.12	-115.40	-112.14	-124.12	-115.40	-112.14	-124.12	-115.40	-112.14
Maximum path loss	dB	**124.25**	**115.69**	**115.43**	**136.39**	**127.83**	**127.57**	**143.48**	**134.92**	**134.66**

Forward Link Budget

Cell Type		Urban - in building			Suburban - in vehicle			Suburban - outdoor		
Service		voice	144 data	384 data	voice	144 data	384 data	voice	144 data	384 data
Maximum path loss	dBm	124.25	115.69	115.43	136.39	127.83	127.57	143.48	134.92	134.66
MS antenna gain	dBd	-2.16	0.00	0.00	-2.16	0.00	0.00	-2.16	0.00	0.00
Body losses	dB	-3.00	-3.00	-3.00	-3.00	-3.00	-3.00	-3.00	-3.00	-3.00
Penetration losses	dB	-18.00	-18.00	-18.00	-8.00	-8.00	-8.00	-1.50	-1.50	-1.50
BS antenna gain	dBd	14.10	14.10	14.10	14.10	14.10	14.10	14.10	14.10	14.10
BS cable loss	dB	-2.97	-2.97	-2.97	-3.45	-3.45	-3.45	-3.45	-3.45	-3.45
Lognormal FM	dB	-7.86	-7.86	-7.86	-6.20	-6.20	-6.20	-5.61	-5.61	-5.61
Sensitivity	dBm	-105.09	-105.33	-105.09	-105.09	-105.33	-105.09	-105.09	-105.33	-105.09
Max Req. Pilot Power	dBm	**39.05**	**28.08**	**28.07**	**40.02**	**29.05**	**29.04**	**40.02**	**29.05**	**29.04**
Max Req. Tot. Power	dBm	**47.29**	**36.32**	**36.31**	**48.26**	**37.29**	**37.28**	**48.26**	**37.29**	**37.28**

	Urban - in building		Suburban - in vehicle		Suburban - outdoor	
Max Req. Pilot Power	28.08	dBm	29.05	dBm	29.05	dBm
	0.64	W	0.80	W	0.80	W
Pilot ERP	39.21	dBm	39.70	dBm	39.70	dBm
Max Path loss	115.69	dB	127.83	dB	134.92	dB

Wizard Display Bands

		Urban - in building	Suburban - in vehicle	Suburban - outdoor
Pilot band	dBm	-76.48	-88.13	-95.23

In this case, the coverage goal is to provide 144 kbps throughput. The link budget assumes that the path is reverse link limited, as is typical. The link budget is primarily based on high-speed data services that the licensee would likely provide, and includes urban in-building coverage, as well as suburban in-vehicle and outdoor coverage to reflect realistically the types of services the licensee would provide.

3) <u>Design Constraints</u>

As mentioned above, the Commission has placed relatively few technical constraints in the proposed Rules. However, they're important in designing the example system herein.
First, the Commission has placed the restriction in 47 C.F.R. §27.55 that, after transition, for "stations in the LBS and UBS, the signal strength at any point along the licensee's GSA boundary must not exceed 47 dBµV/m...." This is for the entire 5.5 or 6 MHz channel bandwidth. Assuming an initial absence of extension agreements between adjoining markets (which are common in the cellular industry), one must design to constrain the signal emissions using narrower beamwidth antennas and lower ERP to meet this requirement. If and when extension agreements are put in place, as is usually mutually beneficial to adjoining carriers, these constraints can be relaxed and coverage spanning market borders can be implemented, along with intersystem handoffs.

47 dBµV/m equates to 223.9 µV/m.
At 2600 MHz, this E field intensity impinging upon a lossless copolarized dipole antenna produces an antenna output:

$$P_r = 3.12\times10^{-11} * E_{\text{field intensity}}^2 / F_{\text{MHz}}^2$$

Yielding 2.313×10^{-13}W, or -96.36 dBm at the antenna terminals. Assuming 20% pilot power (-7dBc), this leads to -103 dBm pilot power at the terminals of a 50Ω, 0dBd gain antenna.

The propagation modeling software used herein, Optimi's Wizard, displays (forward link pilot) power levels in terms of the received power at the terminals of a 0dBd antenna, so the setting a display level of -103 dBm shows the areas where this 47 dBµV/m is reached. The design presented herein was produced with the constraint that not one point displayed in Wizard's prediction could exceed this level at any point on or outside the GSA boundary.

4) Propagation Prediction Details

Since the Rules do not specify a modeling technique to be used in predicting useful coverage or the 47 dBµV/m level at the market boundary (as the Commission did with the 32 dBµV/m contour in 800MHz cellular - the Carey Contour method), we are free to chose among the methods and modeling tools that provide good accuracy in making our predictions. In this design, the modeling tool used is Wizard, sold by Optimi. (This tool was previously a product of Agilent Technologies.) It is widely accepted in the industry, and used by major Cellular and PCS carriers. Its accuracy is comparable to any other competitive product.

In performing this design, a common modeling method was used; the Lee model. In Wizard, this model uses the "slope and intercept" method of calculating RF propagation in a flat environment, adjusted for the height of the transmit site, the site antenna pattern, orientation, and downtilt, as well as the "effective height" (based on surrounding terrain slope) of the receiving antenna, and knife edge diffraction over obstructions.

The terrain data used was USGS Digital Elevation Model (DEM), with 50 meter position 'bins'. This is moderate position resolution, and was chosen as adequate given the overall feature size of the terrain.

As no drive test equipment or data was readily available, propagation parameters could not be adjusted to optimize model performance for the region of interest. Instead, 'standard' PCS parameters were used, and adjusted for the frequency difference between 1950 MHz and 2.6 GHz. The frequency adjustment used was:

$(1.95 \text{ GHz} / 2.6 \text{ GHz})^2 = 0.56 = -2.5$ dB.

This adjustment is made to the 1 Mile intercept value of the 'standard' PCS model parameters, and in the case of Wizard, the adjustment was rounded to –3 dB as only integer values may be entered. For relatively small changes in frequency such as this, the 'slope' parameter is essentially invariant with frequency.

The frequency adjusted propagation parameters used were:

- Dense Urban areas:
  - 1 Mile Intercept = -83.5 dBm
  - Slope = -43.1 dB/decade
- Urban areas:
  - 1 Mile Intercept = -72.5 dBm
  - Slope = -40 dB/decade
- Suburban areas:
  - 1 Mile Intercept = --68.5 dBm
  - Slope = -38.4 dB/decade

In selecting antennas for use in this design, production PCS antenna models were used as it is anticipated that 2.6 GHz antennas will be produced with like patterns and performance as a result of the rebanding Rules.

Please note that the Wizard model most likely *overpredicts* coverage for several reasons. First, Manhattan is one of, if not the most densely built out areas in North America. The surrounding areas in the GSA of WLR500 are also quite urbanized. As a result, 'standard parameters' do not fully realize the magnitude of the blockages caused by manmade structures. This means that, during deployment, a carrier would be well advised to actually test the coverage of each proposed site in the densest areas, taking advantage of line-of-sight to desired coverage areas, and deliberately using obstructions to limit coverage to areas within the GSA.

It's useful to note however that if this design can constrain RF emissions within the 47 dBμV/m boundary limitation while overpredicting coverage, then, in actual implementation, it will be easier to comply with this limitation.

5) Initial Design

The design is presented below. Due to the design constraints imposed by the 47 dBμV/m limitation, the link budget, and the terrain in the area, narrow beamwidth antennas were used to constrain the RF coverage area of most cells. Most sites use 33° beamwidth antennas.

Cells near the GSA boundaries are mostly single sector, placed as close as possible to the boundary, facing into the market. This minimizes unwanted signal emission toward the GSA boundary. Sites are typically 100 foot radiation centerline or less. Many of the GSA boundary sites are at 100 feet, those on Manhattan Island at 75 feet, and some in Bronx, Queens, etc. are at lower elevations, in deference to the fact that higher elevation buildings and towers are expected to be less available.

Cell spacing in Manhattan is roughly ½ mile, with increasing site spacing as population density declines in surrounding areas, and as permitted by the terrain. This spacing is fairly small, but is consistent with mature Cellular and PCS systems in dense downtown areas, for system capacity reasons. In fact, as market penetration increases, the system may have to utilize even lower antenna heights in Manhattan, build more cells, and add in-building systems for some high traffic locations.

Figure 5.1 shows the grandfathered ITFS stations with protected service areas that overlap WLR500's protected service area, and depicts the GSAs of those stations. WLR500's GSA is indicated with red shading. The GSAs were determined in accordance with 47 C.F.R. §27.1206, which provides that a GSA for an incumbent site-based license is the area "that is bounded by a circle having a 35 mile radius and centered at the station's reference coordinates, which was the previous PSA entitled to incumbent licensees prior to January 10, 2005, and is bounded by the chord(s) drawn between intersection points of the licensee's previous 35 mile PSA and those of respective adjacent market, co-channel licensees."

Figure 5.2 shows the population density for RNYE's GSA, based on US Census data. Generally, required system capacity varies with population density, though exceptions exist. Areas which exclusively contain commercial property for instance, may have zero resident population but have high traffic density during business hours.

The design is shown in Figures 5.3-5.5 in varying scales. Manhattan Island, shown in Figure 5.3, has the highest overall signal strength, as this dense Urban area requires the largest building penetration allowance. The remaining New York State side of the market is included in Figure 5.4, showing the coverage in Queens, Bronx, etc.

Figure 5.5 shows the entire GSA, including New Jersey. As population decreases, cell spacing rises, though terrain is the constraining factor in some areas. Signal intensity is allowed to decrease in these areas, as buildings tend to be smaller, and fixed site users may be able to use gain or outdoor antennas to achieve full data rates.

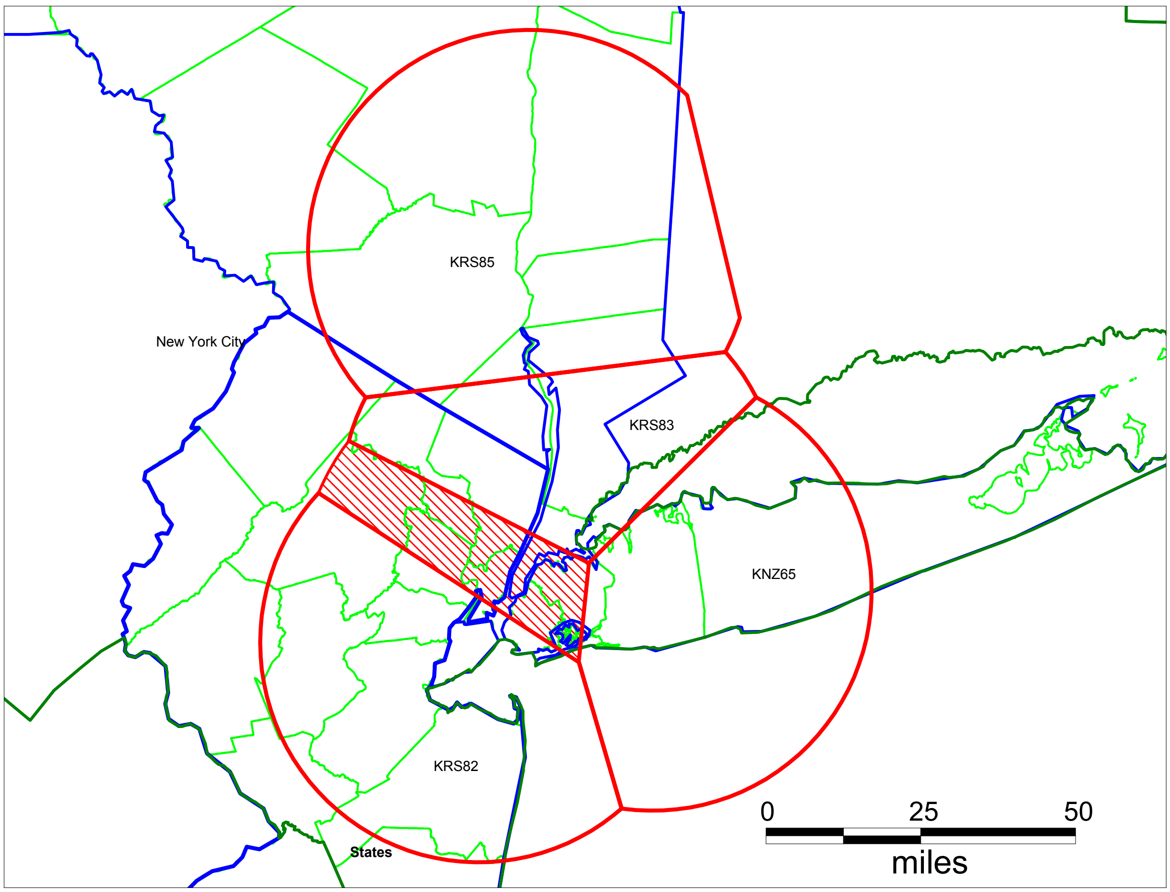

Figure 5.1 E Band Stations overlapping WLR500 PSA

Given the coverage as shown in the example design, population service is as follows:

Urban in building: 1,639,738 persons, 25.2% of the total within the GSA
Suburban in vehicle or better: 4,089,844 persons, 62.9% of the total within the GSA
Suburban open area or better: 5,217,999 persons, 80.2% of the total within the GSA
(Total population within the GSA: 6,507,627)

Previously, the Commission has required carriers to build out PCS systems to cover 33% of the population within 5 years. (In building, in vehicle, or outdoor coverage level wasn't specified). The system as shown in the design far exceeds this requirement. Indeed, just Manhattan Island (in vehicle or better) coverage includes 1,329,726 persons, 20.2% of the GSA population.

In terms of area covered, the GSA is approximately 557 square miles, and predicted coverage is:

Urban in building: 111 square miles, 20% of the total within the GSA
Suburban in vehicle or better: 303 square miles, 54% of the total within the GSA
Suburban open area or better: 413 square miles, 74% of the total within the GSA

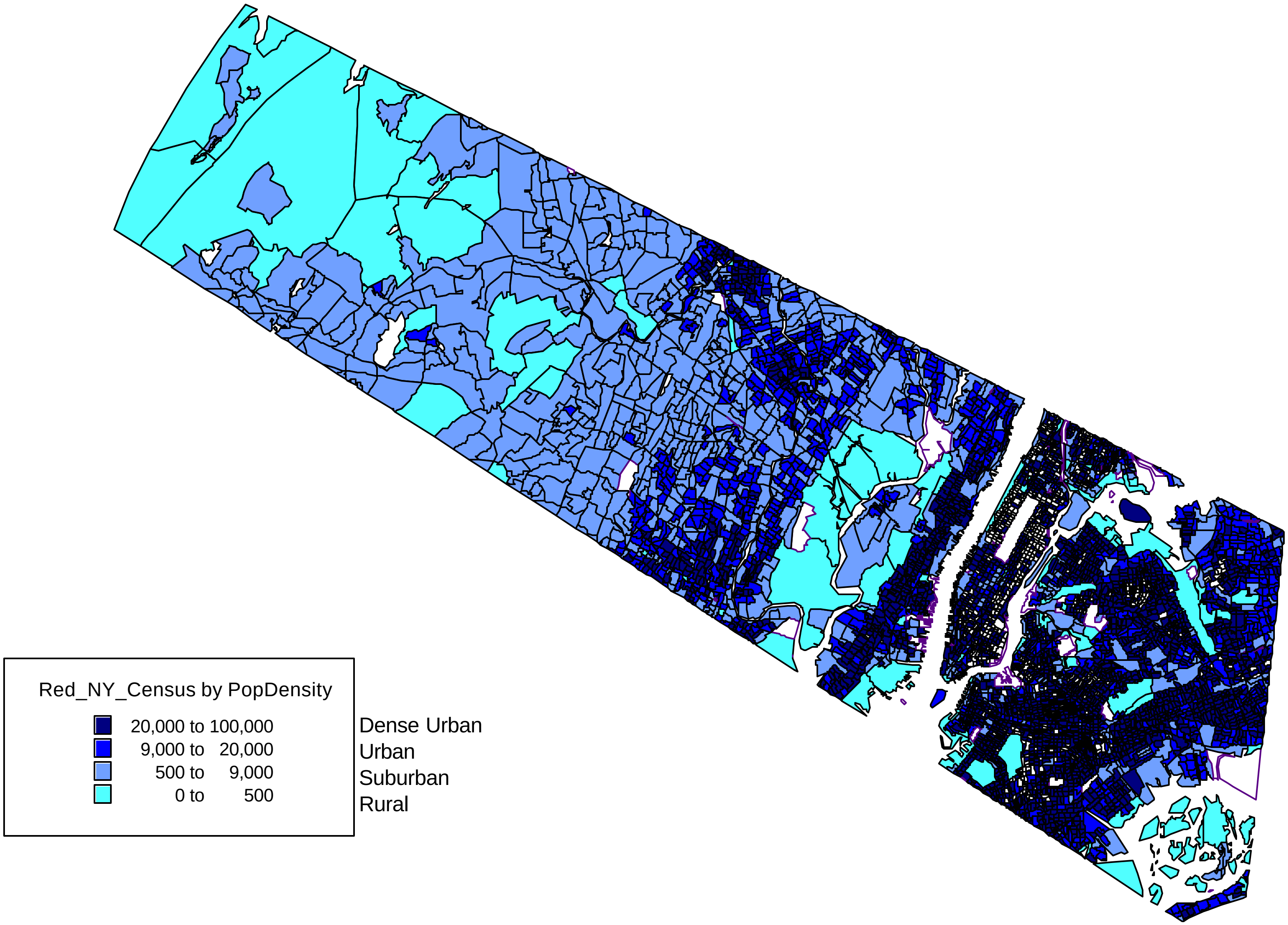

Figure 5.2 - WLR500 GSA Population Density
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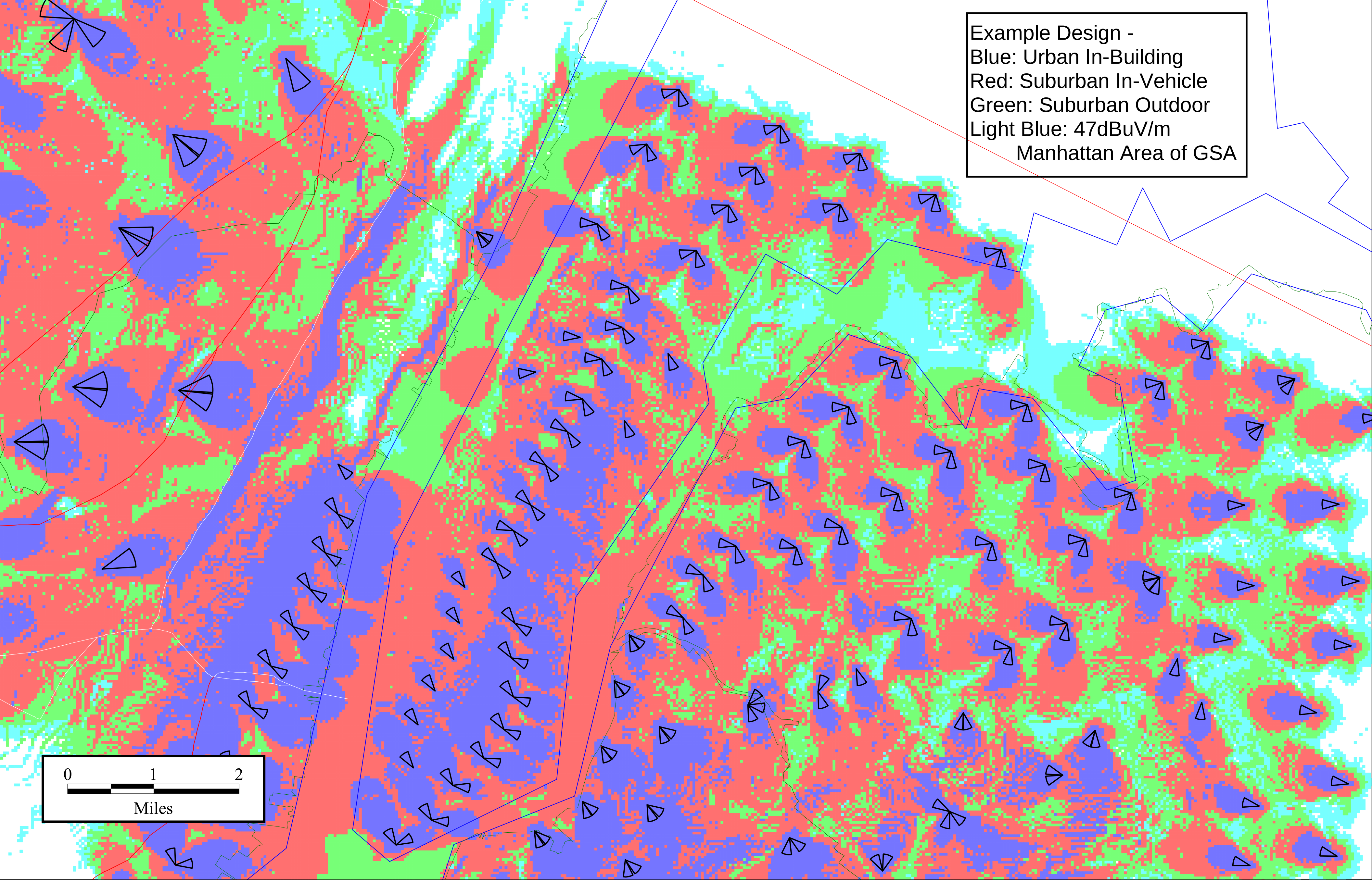

Figure 5.3 - Manhattan Island predicted coverage
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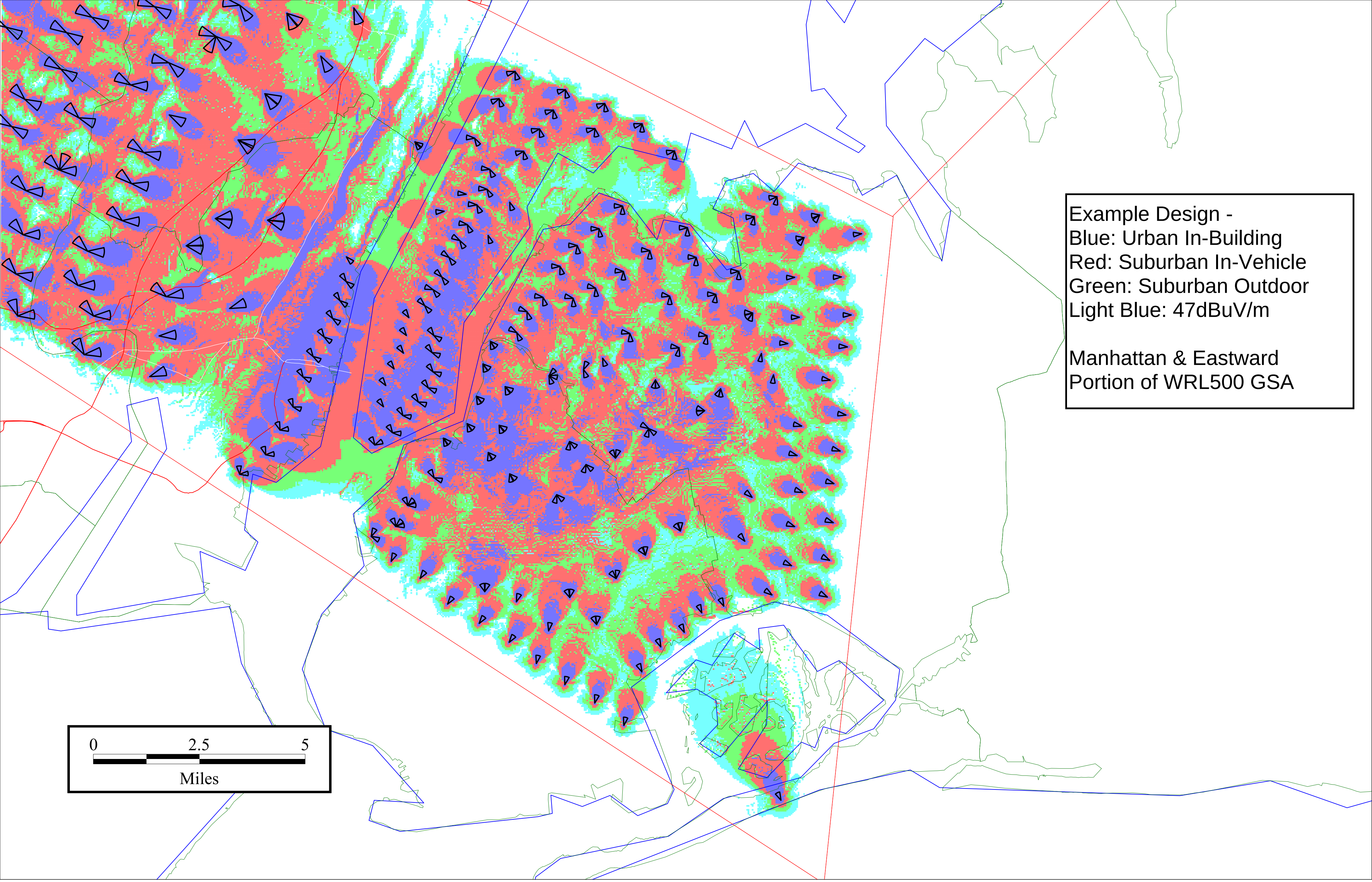

Figure 5.4 - New York State coverage prediction
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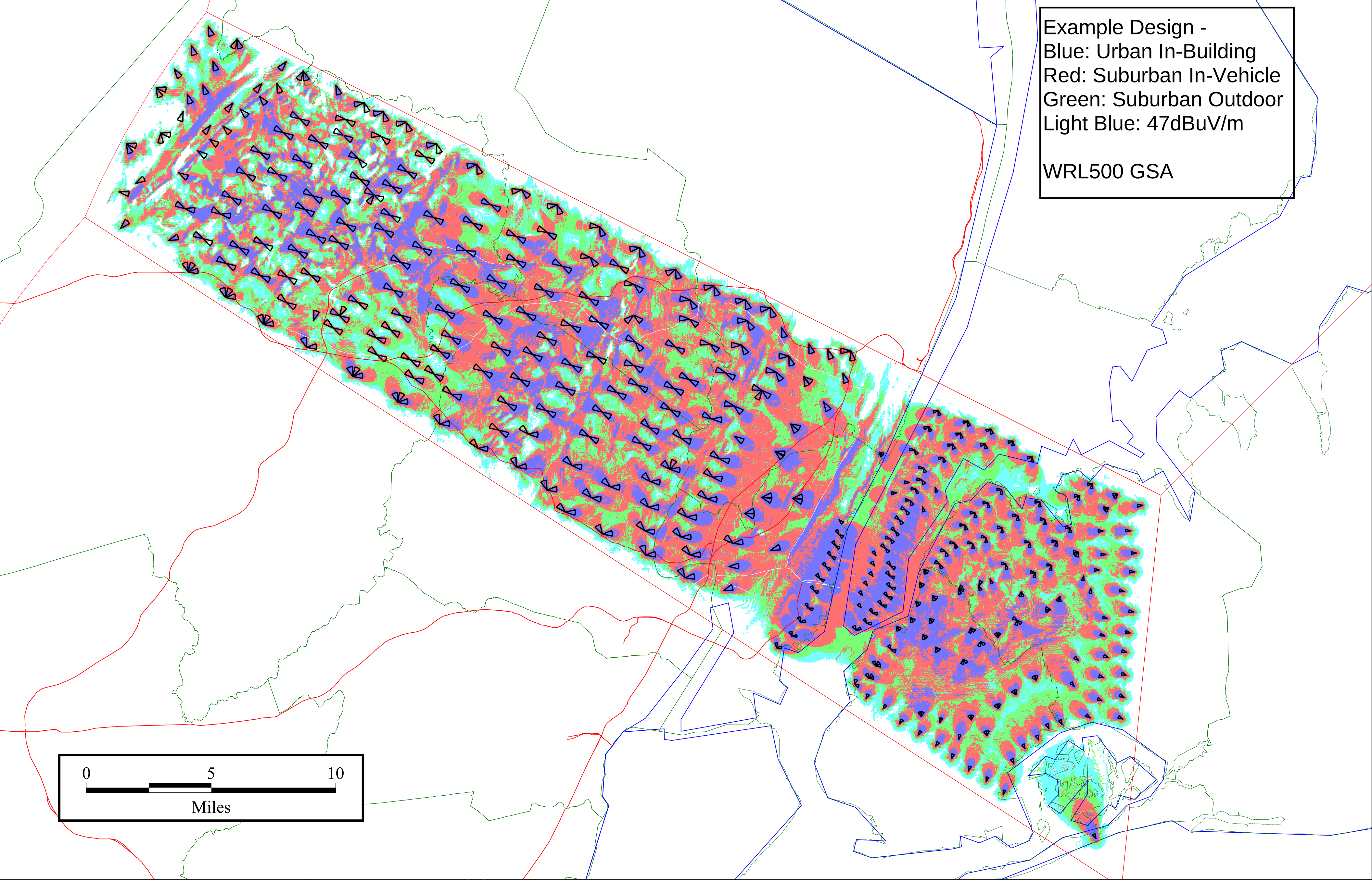

Figure 5.5 - WLR500 GSA predicted coverage
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6) Conclusions

It is technically feasible to build a UMTS TDD system using the 2.6 GHz post-transition spectrum and GSA of WLR500 within the constraints of the Rules imposed by the Commission. This system can serve roughly 80% of the population in the GSA, based on RF coverage predictions and United States Census data.

The choice of UMTS TDD for the design is not the only possible one, as virtually all 3G Cellular/PCS technologies using biphase or quadriphase modulations or variants thereof exhibit comparable energy per bit requirements. This technology is consistent with ITU recommendations for IMT-2000 systems using essentially the same frequency range internationally, so this choice was a logical one from an international roaming and equipment availability standpoint.

This report reflects example choices in technology and design strategy. Those presented are certainly not the only ones possible, and further study may significantly improve the system and its overall performance/cost relationship. Further, if extension agreements are entered into with neighboring markets, as is common and mutually beneficial to carriers in Cellular and PCS systems, the design could be simplified, as signal levels at the GSA boundary could be allowed to exceed 47 dBµV/m.

The goal herein was to determine the technical feasibility of deploying a system with coverage useful to a large segment of the population within the GSA, while complying with the restrictions imposed by the Rules, without relying upon any specific cooperation from neighboring markets, such as extension agreements, or assuming that any special rules would be adopted for MDS and nearby grandfathered ITFS stations. That goal has been met, to the extent possible using the computer modeling approach described herein. Based on the model, the example system could serve 80% of the population while strictly observing the 47 dBµV/m field intensity restriction at the market boundary. Even more efficient system designs may be possible with further study - the design example herein is *a way, not the only way,* to deploy a system within the GSA.

WLR500's PSA is significantly overlapped by multiple stations within very close proximity, thereby creating the GSA depicted in the attached figures. Given that it is feasible to operate a viable system in this GSA under the new Rules applicable to all MDS and ITFS channels, it is reasonable to conclude that, absent any unusual terrain, no special treatment is required for MDS E and F channels and their nearby grandfathered ITFS E and F channels.

In short, based upon the available information, it's possible to deploy a system within this relatively small GSA which would provide useful service to a large segment of the population therein, within the constraints of Commission new Rules. Naturally, further study, propagation testing, and other engineering work are needed prior to actual deployment, but no insurmountable engineering difficulties are anticipated.

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Expires 2/28/2005
(sealed 1/9/2005)

Appendix A) Technical Qualifications

This report was prepared by Christopher J. Hall, P.E., President, Principal Engineer, and Partner of Wireless Systems Engineering, Inc., of Satellite Beach, Florida
Mr. Hall is a licensed Professional Engineer (P.E.) with over 20 years experience as a Cellular, PCS, Land Mobile, Terrestrial, Airborne and Satcom Systems Engineer, including detailed RF, Analog, Digital and Optical hardware design. He is familiar with modulation theory, antennas and propagation, error correcting coding, analog and digital signal processing, communications jamming, flight testing, and radar countermeasures. He holds an M.S.E.E. degree from Georgia Institute of Technology (1980), and holds several patents in Communications, Optics, and E-911 (TDOA geolocation) technology areas.

Wireless Systems Engineering, Inc. provides general RF engineering consulting support to Cellular and PCS carriers, as well as other clients. Cellular and PCS specialties include system design, system configuration, site selection, frequency reuse planning, traffic analysis and growth planning for major markets as well as smaller, rural markets. WSE engineers are experienced in 800/900 MHz Cellular Radio and 1900 MHz PCS systems, including all major protocols; EAMPS/NAMPS, CDMA, TDMA, GSM, iDEN, IMT-2000, etc. (Further information regarding the company, its specialties, and capabilities, may be found at www.wse.biz)